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09/199,829	11/25/1998	PATRICIA B. SMITH	TI-25250	4119

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EXAMINER
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Please find below and/or attached an Office communication concerning this application or proceeding.

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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Paper No. 18

Application Number: 09/199,829
Filing Date: November 25, 1998
Appellant(s): SMITH ET AL.

Smith et al.
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed 03/25/2002.

(1) Real Party in Interest

A statement identifying the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The brief does not contain a statement identifying the related appeals and interferences which will directly affect or be directly affected by or have a bearing on the decision in the pending appeal is contained in the brief. Therefore, it is presumed that there are none. The Board, however, may exercise its discretion to require an explicit statement as to the existence of any related appeals and interferences.

(3) Status of Claims

The statement of the status of the claims contained in the brief is correct.

(4) Status of Amendments After Final

No amendment after final has been filed.

(5) Summary of Invention

The summary of invention contained in the brief is correct.

(6) Issues

The appellant's statement of the issues in the brief is correct.

(7) Grouping of Claims

Appellant's brief includes a statement that claims 1, 4-6 and 25-31 do not stand or fall together and provides reasons as set forth in 37 CFR 1.192(c)(7) and (c)(8).

(8) Claims Appealed

The copy of the appealed claims contained in the Appendix to the brief is correct.

(9) Prior Art of Record

5,578,526	Akram et al.	11-1996
3,837,856	Irving et al.	09-1974

(10) Grounds of Rejection

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

1. Claims 1, 4-6 and 25-31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Akram et al. (U.S. 5,578,526) in view of Irving et al. (U.S. 3,837,856).

In re claims 1, 25, and 29, Akram et al. (herein referred to as Akram) shows, in an analogous art related to fabrication multi chip modules, in Figures 1A-1D providing a semiconductor wafer (12) containing oxygen sensitive material; forming a layer of a first material (16) over the oxygen sensitive material; forming a photoresist layer (18) over the layer of the first material; patterning the layer of the first material; and removing all of the photoresist layer after patterning the layer of the first material using a "piranha" etch (column 4, line 55 - column 5, line 22).

Akram does not show wherein the photoresist layer is removed using a downstream plasma process including hydrogen or deuterium and substantially no oxidizing component.

Irving teaches that photoresist may be removed from a substrate using a downstream plasma process including hydrogen or deuterium and substantially no oxidizing component. Irving further teaches wherein the aforementioned downstream plasma process is preferable compared to wet etch type photoresist removal processes

because photoresist wet etch removal solutions decompose rapidly and thus require frequent changes (column 2, line 15 - column 4, line 28).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to remove the photoresist of Akram using the method as described by Irving since the "piranha" etch used in Akram is a well known photoresist wet etch removal solution that decomposes frequently and, as evidenced by Irving, the downstream plasma process of Irving is a well known photoresist removal method which can overcome the problems associated with wet etchant photoresist removal systems.

In re claims 25 and 29, Akram also discloses that the layer of first material is oxygen sensitive material f column 4, line 55 - column 5, line 22).

Akram in view of Irving does not show removing residue on the semiconductor wafer after removing the photoresist layer using a downstream plasma process including hydrogen or deuterium and substantially no oxidizing component.

It would have been obvious to one of ordinary skill in the art at the time the invention was made, in light of the fact that the downstream plasma process of Irving, in the invention of Akram in view of Irving removes all of the photoresist (Irving, column 3, line 66 – column 4, line 2), any and all residues remaining from any impartial removal of the photoresist layer would also have been removed.

In re claims 4, 26, and 30, Irving shows a process wherein the downstream plasma process includes a gas mixture of which 60% to 100% of the gas mixture is made of hydrogen or deuterium (column 3, lines 11-14).

In re claims 5 and 27, Irving teaches that the downstream plasma process may include gases such as any one of hydrogen and nitrogen (column 3, lines 11-14). Irving also teaches that the temperature range required in removing the photoresist material while using nitrogen gas is in excess of 200 °C while the temperature range required in removing the photoresist material while using hydrogen gas is in the range between 100° and 120 °C (column 4, lines 9-21).

Akram in view of Irving does not disclose wherein the removing the photoresist layer is performed in a temperature range of 245° to 350 °C. It would have been obvious to one of ordinary skill in the art at the time the invention was made to perform the downstream plasma photoresist removal process of Akram in view of Irving at a temperature range of 245° to 350 °C since, as evidenced by Irving, a combination of gases may be used and, with each different gas used, a different photoresist removal temperature range is appropriate. Thus, by applying a proper combination of downstream plasma photoresist removal gases, it would have been obvious to one of ordinary skill in the art to expect the discovery of a photoresist removal temperature within a range of 245° to 350 °C and the discovery of the optimum or workable ranges of a process temperature would have involved only routine skill in the art. Furthermore, the specification contains no disclosure of either the critical nature of the claimed process temperature or any unexpected results arising therefrom. Where patentability is said to be based upon particular chosen temperature ranges or upon another variable recited in a claim, the applicant must show that the particular temperature ranges are critical.

In re claims 6, 28, and 31, Irving shows wherein downstream plasma process further includes a gas made of argon, nitrogen, and any other inert gas f column 3, tine 10 - column 4, line 38).

(11) Response to Argument

Appellants' argue, "...the Irving et al. patent is enabling with regard to the use of oxygen and nothing else...". Furthermore, appellants' argue, "...beyond providing a wish list of additional gases the Irving et al. patent does not teach how any of these gases can be used. It is obvious that hydrogen cannot merely be sustained for oxygen using the same apparatus and conditions outlined in the patent. Therefore the use of hydrogen without oxygen is clearly not taught, or enabled, or reasonably suggested by the Irving et al. patent. The Irving et al. patent being clearly not enabling with regard to the use of hydrogen cannot...be used to render the method of the instant invention obvious. As such, while the Irving et al. patent is a valid reference for oxygen it is not a valid reference for the use of hydrogen..." (page 4, lines 7 – 26).

In response to this argument, appellants assert that Irving et al. does teach using oxygen to remove a photoresist layers. However, column 3, lines 11-14 clearly states, "...any one of a number of gases can be used such as oxygen, nitrogen, hydrogen and helium...". Furthermore, in column 4, lines 8 – 28 of Irving et al. states, "...during the process there may be a temperature of the wafers or substrate within the camber from room temperature to 100°C to 120°C using hydrogen or oxygen...the temperature should be below the temperature which causes substantial redistribution of any deposits in the substrate during the time required for removal of photoresist...with photoresist

having different thickness of varying compositions or using gases other than oxygen, it may take as much as 10 to 15 minutes to remove all of the photoresist...".

From these arguments, it is clear that Irving et al. teach using other gases such as hydrogen to remove a photoresist layer, and provide parameters to perform such process. Therefore, the examiner respectfully submits that the Irving et al. patent does teach how to use gases other than oxygen in the same apparatus. Accordingly Irving et al. does teach the claimed limitation of a plasma process including hydrogen or deuterium and substantially no oxidizing component.

In conclusion, claims 1, 4-6 and 25-31 stand rejected.

An appeal conference was held on November 21, 2002 and the participants of this conference were Julio J. Maldonado, Olik Chaudhuri and George Fourson.

Conclusion

Papers related to this application may be submitted directly to Art Unit 2823 by 1facsimile transmission. Papers should be faxed to Art Unit 2823 via the Art Unit 2823 Fax Center located in Crystal Plaza 4, room 3C23. The faxing of such papers must conform to the notice published in the Official Gazette, 1096 OG 30 (15 November 1989). The Art Unit 2823 Fax Center number is **(703) 305-3432**. The Art Unit 2823 Fax Center is to be used only for papers related to Art Unit 2823 applications.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to **Julio J. Maldonado** at **(703) 306-0098** and between the hours of 8:00 AM to 4:00 PM (Eastern Standard Time) Monday through Friday or by e-mail via julio.maldonado@uspto.gov. If attempts to reach the examiner by telephone

are unsuccessful, the examiner's supervisor, Olik Chaudhuri, can be reached on (703) 306-2794.

Any inquiry of a general nature or relating to the status of this application should be directed to the **Group 2800 Receptionist** at **(703) 308-0956**.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

Julio J. Maldonado
Examiner
Art Unit 2823

JMR
December 2, 2002

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